

and 3. The stylet (18) is seen within the lumen of the elastic catheter (12) which is within the lumen of the external cannula (10).

FIG. 5 is a cross-sectional view of the deflectable needle assembly of FIGS. 1–3, taken through line A—A of FIGS. 2 and 3. This view is through the removable stopper insert of the assembly. It can be seen that the lumen (26) of the removable stopper insert (27) opens to the exterior via a lateral slot (28).

FIGS. 6 and 7 show a preferred embodiment of a proximal handle system of a deflectable needle assembly of the invention. FIG. 6 shows the same assembly as in FIG. 7, however, in FIG. 6 the catheter is retracted proximally into the lumen of the cannula (39). Note that in this figure, the catheter is not retracted so far as to create a single beveled edge at the distal end (48). Rather, the distal tip of the catheter (38) and the beveled edge of the distal cannula tip (40) are distinguishable.

FIG. 7 shows the curved end (35) of a distal catheter end (36) with the catheter fully protracted distally from the distal end (37) of the cannula (39). In the drawing, the distal end of the catheter (36) shows a sharp distal tip (38), however, a catheter of the invention need not have a sharp edge.

FIG. 8 is a cross-sectional view taken at line C—C of FIG. 7. The cross-sectional view shows the stylet (45) within the lumen of the catheter (46) within the lumen of the external cannula (47).

Referring to the proximal end (49) of the assemblies of FIGS. 6 and 7, the proximal handle will be described. The cannula handle (51) may include an egress/ingress channel (52). The proximal end of the egress/ingress channel (54) may include standard mechanisms for attaching syringes or fluid lines, for example as shown here a cap (53) on a luer lock end (not visible in this view).

FIG. 6 shows a view of the proximal catheter (55) when the distal end of the catheter (36) is retracted within the lumen of the cannula (39). The catheter handle (56) may also include an egress/ingress channel (57) which has a standard opening for attachment of a fluid line or syringe at the proximal end (58), shown here with a cover (59) over a luer lock end (not visible in this view). (60) is the stylet handle. The stylet can be removed by retracting the handle (60) proximally. The proximal aspect of the catheter handle which is covered here by the stylet handle (60), may include a channel opening for attaching a fluid line or syringe as described above.

The assembly depicted in FIGS. 6 and 7 also provides for the prevention of proximal or distal sliding of the catheter within the cannula. According to this embodiment, a coupler (62) is present between the cannula handle (51) and the catheter handle (56). A slidable stopper is not visible in FIGS. 6 and 7 because it is covered by the coupler (62). A longitudinal cross-sectional view of the slidable stopper (67), within the coupler, is shown in FIG. 9. FIG. 10 is a close up of the area circled in FIG. 9. The slidable stopper (67) of FIG. 9 is a structure which is slidably movable over the proximal catheter (55) and interposed between the proximal end of the cannula handle and the distal end of the catheter handle (not shown). Still referring to FIGS. 6, 7 and 9, the stopper (67) has a luminal surface (68) and a peripheral surface (69). The threads (70) of the coupler (62) allow for threading the coupler onto the proximal end of the cannula handle (51). In so doing, the luminal surface (68) of the stopper (67) is compressed around the proximal catheter (55). Typically, the stopper (67) can be geometrically attached within the coupler (62) using, for example, a

projection (71) and projection receiving notch (72). The compression of the luminal surface (68) of the stopper (67) around the proximal catheter (55) serves two functions. First, it fixes the components of the deflectable needle system as a single unit. Second, it prevents leakage of fluid moving proximally within the cannula.

Another mechanism for preventing proximal fluid leakage is also shown in FIGS. 6, 7, 9 and 10. In FIGS. 6 and 7, the cannula handle (51) contains a hollow proximal end comprising a female receptacle (61). The hollowed receptacle (61), at the proximal end of the cannula, can couple to a coupler (62) which is between the catheter handle and cannula handle (51) as shown. Leakage is prevented by use of a cap. Referring to FIGS. 9 and 10, a cap (65) is seen compressed against an inside surface (66) of the hollowed receptacle (61) of the proximal end of the cannula handle (51) to inhibit leakage of fluid which may be travelling proximally in the cannula system. The exterior surface of the receptacle may have threads (70) for coupling to the coupler (62).

FIGS. 9 and 10 also depict a particularly preferred embodiment. According to this embodiment, the proximal end of the stopper (73) includes a cap (65) which fits within the hollowed inside surface (66) of the receptacle (61) of the proximal end of the cannula handle (51). Thus, use of this embodiment provides for prevention of fluid leakage and fixation of the telescoping components when the coupler (62) is coupled to the proximal end of the cannula handle (51).

All patents in the specification are indicative of the level of ordinary skill in the art to which this invention pertains and are incorporated herein by reference.

It will be apparent to one of ordinary skill in the art that many changes and modifications can be made in the invention without departing from the spirit or scope of the appended claims.

I claim:

1. A deflectable needle assembly for accessing a physiological site in a body, wherein said access to said physiological site is obstructed by a non-penetrable object, said deflectable needle assembly comprising a proximal end and a distal end and:

a cannula, said cannula having a lumen, a proximal end, a distal end and a beveled distal tip;

a catheter, said catheter having a lumen, a proximal end, a curved distal end, and a beveled distal tip, wherein said catheter can be inserted within said lumen of said cannula such that said distal end and said distal tip of said catheter can be protracted distally beyond, or retracted proximally within, said distal end of said lumen of said cannula and said catheter can be axially rotated within said lumen of said cannula; and

a stylet, said stylet having a proximal end and a distal end and said stylet can be inserted in said lumen of said catheter,

wherein said curved distal end of said catheter is straight when said catheter is retracted proximally within said distal end of said lumen of said cannula.

2. The deflectable needle assembly according to claim 1 comprising more than one catheter.

3. The deflectable needle assembly according to claim 1 wherein said catheter is manufactured from a selected one of an elastic and superelastic material.

4. The deflectable needle assembly, according to claim 1 wherein said catheter is comprised of nickel titanium (NiTi).

5. The deflectable needle assembly according to claim 1 wherein said distal tip of said catheter has a sharp edge.